Department of Mathematics

Course Profile

Course Number: MATH 212	**Course Title: Complex Analysis I**
Required / Elective: Required	**Prerequisites:** MATH 201
Catalog Description: Complex numbers, power series and convergences, limits. Exponential functions and logarithm, branch points and branch cuts. Continuity, derivative, Cauchy-Riemann equations. Contour integral, Cauchy-Goursat theorem, Monreas theorem, integration with residues. Liouville theorem. Maximum values of functions. Taylor and Laurent series.	**Textbook / Required Material:** Complex Variables and Applications, Fourth Edition, By Ruel V. Churchill, Mc-Graw Hill. Inc., 2005.
Course Structure / Schedule: (3+2+0) 4 / 8 ECTS	
Extended Description: Complex numbers, Triangle inequality, polar form;Roots ,Some definitions, sequences and series of complex numbers, functions of a complex variable, Limits, continuity Derivative, Cauchy-Riemann equations, Analytic functions, harmonic functions, exponential functions, trigonometric and hyperbolic functions. Logarithmic functions, inverse trigonometric functions. Integrals of complex functions, Cauchy's theorem, Applications of Cauchy's theorem. Independence of path, Cauchy's integral formula , Liouville's theorem. Fundamental theorems of algebra, Power Series Singular points and Laurent series. Residue Theorems, Uniform convergence, Taylor Series Evaluation of improper real integrals.	
Design content: None	**Computer usage:** No particular computer usage required

Course Outcomes: By the end of the course, the students should be able to

1. Learn complex variables, complex roots of an algebraic expression, analytical functions, contour integrals, integral representation of analytical functions, evaluation of improper integrals **[2, 3, 6],**
2. Apply complex function theory to the solution of some engineering problems like plane elasticity theory, plane potential flows of an incompressible fluids and electromagnetic theory **[2, 3, 6, 7],**
3. Calculate various definite integrals by use of the residue theorems **[2, 3, 6, 7],**
4. Solve some partial differential equations depending on two independent variables, like Laplace equation **[3, 6],**
5. Provide a mathematical background needed by the professional subjects **[2, 3, 6, 7]**.

[2] Demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,

[3] Demonstrate the ability to apply mathematics to the solutions of problems,

[6] Have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry,

[7] Have an ability to function both independently and as a member of a multidisciplinary team.

Recommended reading:

Complex Analysis, Third Edition, by Lars V. Ahlfors, Mc-Graw Hill. Inc., 1979.

Schaum's Outline of Complex Variables, by Spiegel, Murray R.

Teaching methods: Lectures, tutorials, presentation, assignments.

Assessment methods: Homework, quiz, midterm and final exams, class presentation, class survey.

Student workload:

Pre-reading	55 hrs
Lectures ……	45 hrs
Preparatory reading ……..	50 hrs
Literature review for presentation……	30 hrs
Team work for presentation ……	20 hrs
TOTAL …… 200 hrs …… to match 25x8 ECTS	

Prepared by: Hilmi Demiray	Revision Date: 08.02.2010